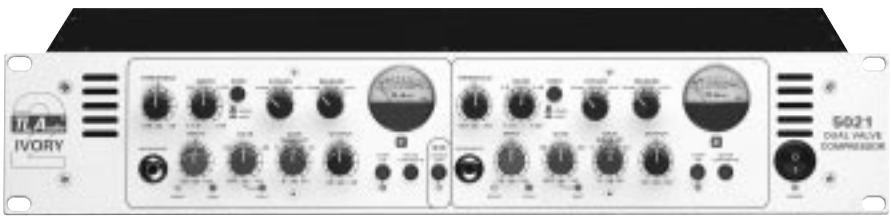
TL Audio®

user manual

Ivory 2 Series

5021



DUAL VALVE COMPRESSOR

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1 INTRODUCTION

Congratulations on purchasing the Ivory 2 5021 Dual Valve Compressor by TL Audio!

The Ivory 2 Series consists of a range of hybrid valve signal processors, which utilise low noise solid state electronics in conjunction with classic valve circuitry to produce audio processing units offering very high quality signal paths with the unique valve audio character. The Ivory 2 Series units offer comprehensive control facilities, whilst remaining straightforward to operate, and represent excellent value for money.

The block diagram of the 5021 is shown in Figure 1. A solid state, electronically balanced input amplifier is used to achieve state of the art performance with very low noise, low distortion and wide bandwidth. An ECC83/12AX7A triode valve stage (run from a stabilised 150v DC supply) is used as a second stage voltage amplifier, to obtain the classic valve sound and gradual overdrive characteristics. Like all other TL Audio compressors, the gain control element of the 5021 is based around a special transconductance amplifier, which avoids the use of VCAs and helps contribute to the smooth, open sound of the unit. A second ECC83 valve stage forms part of the compressor gain make-up circuit.

The 5021 has both line and instrument inputs, a compressor (with variable controls) and a noise gate. Two illuminated VU meters monitor the output level or the gain reduction. The optional DO-2 digital card allows 24-bit A to D conversion via an RCA phono type SPDIF output, with selectable 44.1 or 48 kHz sample rates and the option to clock the converter to an external word clock source.

Line inputs and outputs are provided on electronically balanced XLR connectors and on unbalanced mono 0.25” jack connectors, both of which can be used simultaneously. The operating level of the inputs and outputs can be shifted by 14dB from -10dB to +4dB (for the unbalanced connectors) or +4dB to +18dB (for the balanced connectors) via a rear panel switch, enabling the 5021 to be used with the latest generation of digital recorders - which generate very high signal levels. A front panel instrument input is also provided, thus allowing guitars, basses and keyboards to feed directly into the 5021, removing the need for a separate DI box.

The compressor sidechain connectors on the rear of the 5021 can be used to connect an external processor such as an equaliser into the compressor circuit. This allows the compressor to effectively become frequency conscious, as the compressor then becomes more sensitive to any boosted frequencies on the equaliser. A typical application of this would be to “de-ess” (remove sibilance) from a source by boosting the sibilant frequency on the side-chained equaliser.

Please read this manual fully before installing or operating the 5021.

2 PRECAUTIONS

The Ivory 5021 requires very little installation, but like all electrical equipment, care must be taken to ensure reliable, safe operation. The following points should always be observed:

- All mains wiring should be installed and checked by a qualified electrician,

- Ensure the correct operating voltage is indicated on the rear panel before connecting to the mains supply,

- Never operate the unit with any cover removed,

- Do not expose to rain or moisture, as this may present an electric shock hazard,

- Replace the fuse with the correct type and rating only.

Warning: This equipment must be earthed.

3 INSTALLATION

3.1 AC Mains Supply.

The unit is fitted with an internationally approved 3 pin IEC connector. A mating socket with power cord is provided with the unit, wired as follows:

Brown: Live.

Blue: Neutral.

Green/Yellow: Earth (Ground).

All mains wiring should be performed by a qualified electrician with all power switched off, and the earth connection must be used.

Before connecting the unit to the supply, check that the unit is set for the correct mains voltage. The unit is internally set for 110-120V 60Hz or 220-240V 50Hz operation, and should only be changed by an authorised service centre. The mains fuse required is 20mm anti-surge, 1AT rated at 250V. If it ever necessary to replace the fuse, only the same type and rating must be used. The power consumption of the equipment is 20VA.

Warning: attempted operation on the wrong voltage setting, or with an incorrect fuse, will invalidate the warranty.

3.2 Audio Operating Level.

The 5021 is equipped with inputs and outputs suitable for connection to a wide variety of other audio equipment. Generally, the balanced XLR connections will be required for interfacing to other professional equipment, where the operating level (line-up level or nominal level) will be +4dBu, or approximately 1.2V rms. The unbalanced jack connectors are generally intended for

interfacing to semi-professional equipment and have an operating level of -10dBu, or about 225mV rms. However, the input and output level switches allow these levels to be shifted by 14dB, i.e. to +18dBu on the XLRs (suitable for high levels from a digital machine), and +4dBu on the unbalanced jacks. The normal default mode would be the +4dBu balanced setting, but if - upon feeding a digital multitrack machine into the 5021 line inputs - clipping occurs even on low input gain settings, then the +18dBu setting should be used. Similarly, If the line output of the 5021 is fed into a digital multitrack input and very large amounts of 5021 output gain are necessary to register 0dBfs on the recorder, the +18dBu setting should be used, allowing the 5021 output gain to be set at a more conservative level.

The 5021 may be used to shift operating levels, for example by connecting the unbalanced output of a semi-pro mixing console to the 5021's unbalanced input, and taking the balanced output of the 5021 to the balanced input of a tape machine at +4dBu. All line-level inputs and outputs of the 5021 may be used simultaneously if required. Balanced interconnection is always preferable to obtain the best headroom and noise rejection, but can only be used effectively if the other equipment in the chain, e.g. the mixing console, also has provision for balanced connections.

3.3 Balanced Line Input.

The line level input is via a 3 pin female XLR connector, suitable for balanced or unbalanced line sources at a nominal level of +4dBu. The mating connector should be appropriately wired as follows for balanced or unbalanced operation:

Balanced inputs:

- Pin 1 = Ground (screen).

- Pin 2 = Signal Phase (also known as "+" or "hot").

- Pin 3 = Signal Non-Phase ("-" or "cold").

Unbalanced inputs:

- Pin 1 = Ground (screen).

- Pin 2 = Signal Phase ("+" or "hot").

- Pin 3 = Signal Ground.

When using unbalanced signals into the balanced XLR input, the signal ground may be obtained by linking pins 1 and 3 in the mating XLR connector. If this connection is not made, a loss in level may result.

3.4 Unbalanced Line Input.

An unbalanced line level input at a nominal level of -10dBu is also provided, on a 0.25” mono jack socket. The mating plugs should be wired as follows:

- Tip = Signal Phase (“+” or “hot”).

- Screen = Ground.

3.5 Instrument Input.

Each channel has a 0.25” jack socket on the front panel (see Figure 2). A 2 pin (mono) jack plug is required, which should be wired as follows:

- Tip = Signal Phase (“+” or “hot”),

- Screen = Ground.

3.6 Balanced Output.

The output is via a balanced, 3 pin male XLR connector. The mating connector should be wired as follows:

- Pin 1 = Ground (screen).

- Pin 2 = Signal Phase (“+” or “hot”).

- Pin 3 = Signal Non-Phase (“-” or “cold”).

3.7 Unbalanced Output.

An unbalanced line output is provided for each channel, on a 0.25” mono jack socket.

- Tip = Signal Phase (“+” or “hot”).

- Screen = Ground.

3.8 Sidechain Insert Point.

The insertion point is provided on a 3 pin, 0.25” switched jack socket on the rear of the unit. The pin connections are:

FIG 2: FRONT PANEL

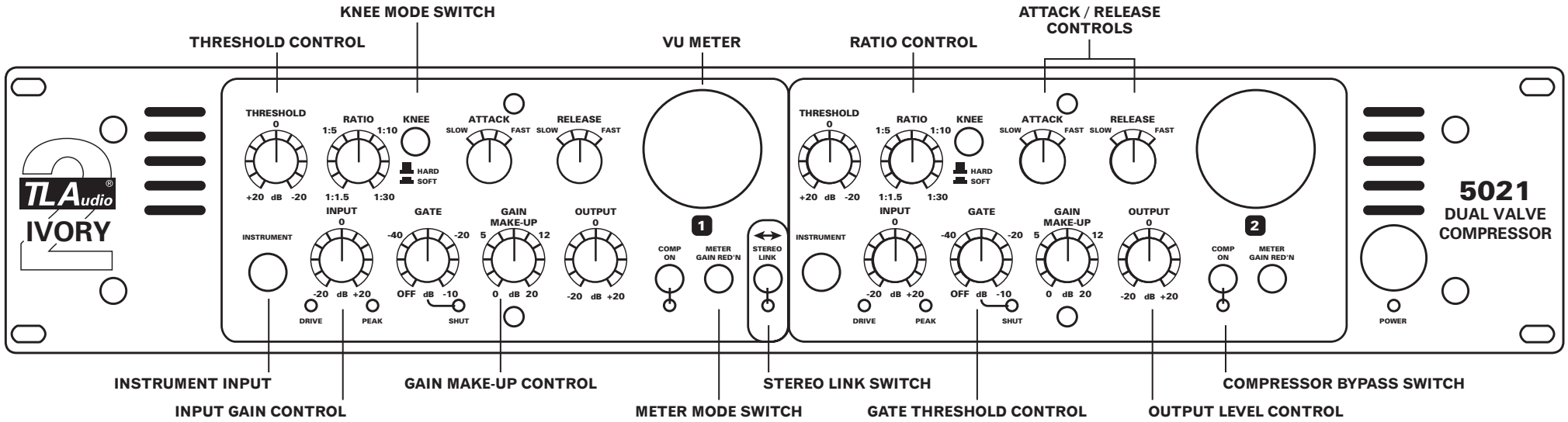
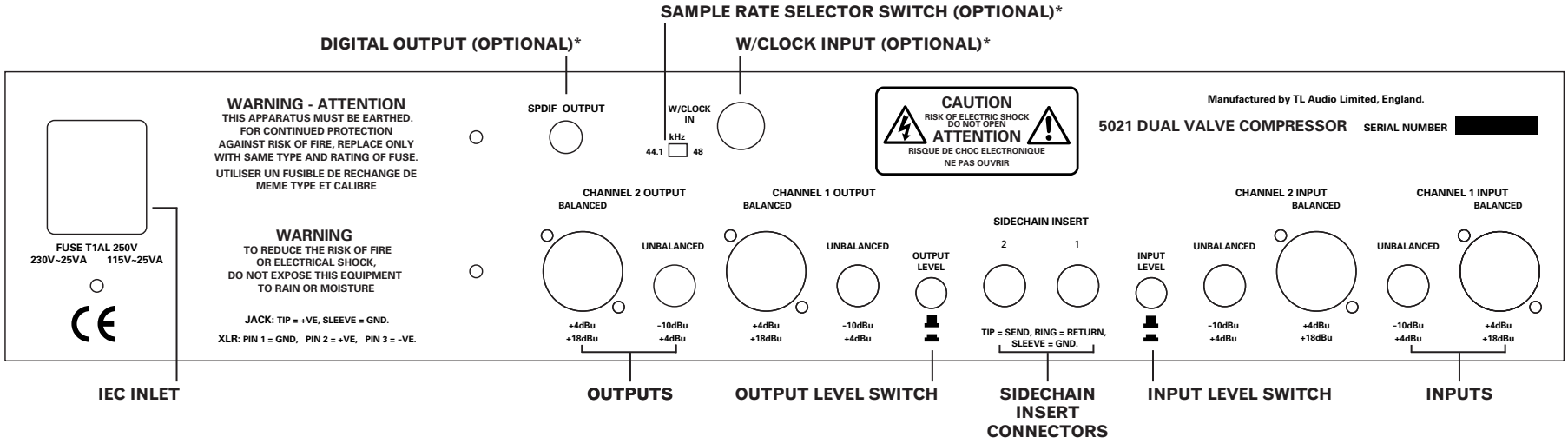


FIG 3: REAR PANEL



*** VIA DO-2 DIGITAL OUTPUT CARD**

- Sleeve = Ground.

- Tip = Send.

- Ring = Return.

The insertion point is unbalanced, and operates at a nominal level of -2dBu. If used as an additional send only (e.g. as a send to a tape machine or monitor mixing desk), the Tip and Ring should be wired together, to preserve the signal path through the insertion point. When used in this manner, the send will be post-compressor. Please note that the sidechain insert is normally used for frequency conscious compression only (see section 4.14) and doesn't break into the signal path in the same manner as a standard console insert point. It doesn't for instance allow you to insert an EQ "in-line" between the 5021 line input and compressor sections.

3.9 Mounting.

The 5021 may be free standing, or mounted in a standard 19" rack. Always ensure that the cooling vents on the front and sides are clear of obstruction, and do not subject the unit to an external source of heat (by mounting immediately above a power amplifier, for example). If used free standing, ensure that the equipment is protected against rain and spillage of liquid.

3.10 Rear Panel.

The rear panel connectors are identified in Fig.3. Make sure that all settings, mains and audio connections have been made as described above before attempting to operate the equipment.

4 OPERATION

4.1 What is Compression?

Compression is an essential but often misunderstood process in modern recording. Put simply, compression reduces the difference between the loudest and the quietest levels of an audio signal. This is known as reducing the "dynamic range" of that signal and is a powerful tool for an engineer helping to avoid overloading & distortion problems, as well as raising the level of the quieter parts of the audio signal. Before the introduction of compressors the only way this could be achieved was by "gain riding", whereby an engineer would control the fader manually in order to try and anticipate very large levels (which might distort the signal) or very low levels (which may get lost in noise). The introduction of compression devices meant that this process could be

controlled automatically, allowing the engineer to get on with more productive jobs!

Many instruments and voices have a very wide dynamic range that need to be controlled. A singer, for instance, may be projecting quietly one moment and very loudly the next, and unless compression is applied the vocal won't "sit" correctly in the mix, in addition to the problems of distortion on loud passages and noise on quiet ones. Compressors effectively turn down the loud bits and turn up the quiet bits, to achieve a more even and controllable level.

Compressors are often judged by their ability to control the dynamics without creating noticeable audible side effects. Heavy compression can cause the signal to pump or breathe with the onset and release of the compression. Some compressor designs can dull the signal and lose the top end of the signal. The 5021 compressor design, like other TL Audio compressors, uses a technology based around a transconductance amplifier rather than a VCA design. This transconductance amplifier design is known for being able to retain the full frequency range and natural character of the audio signal, even when compressing the signal quite heavily. The 5021 is also capable of more severe compression based around the optional Hard Knee mode if this is desired.

There are other benefits of compression as well as just controlling the peaks and raising the quiet parts. Applied properly, it can add punch and excitement to music, as well as fattening up sounds and creating a more professional sounding recording. With the 5021, you have the added benefit of valve stages in the signal path, which create a warmth and presence just not obtainable with solid state or digital products.

4.2 Why Valve Compression?

Valve compression yields a particularly special sound which has become very sought after, particularly with the widespread use of digital products. The reason valve equipment sounds special is due to two things: harmonic distortion and natural compression. When the signal through a valve is increased, it tends to generate a particular type of subtle and desirable distortion, called "second harmonic" distortion. This has the effect of thickening and warming the sound, and the more the level you feed to the valve stages, the more of this harmonic distortion will be produced. You should be able to hear this effect as you increase the input gain on the 5021.

Secondly, valves will tend to naturally compress an audio signal, again particularly as the signal level is increased. This itself also contributes to the warmth produced by the 5021.

4.3 Overview of Compressor Operation.

To operate the 5021 successfully, an understanding of each control will help to obtain the best results. If you are unfamiliar with the effect of compression it may help to adjust each individual control to extreme settings and listen to the sonic effect. Generally compressors are used in two different ways: either to enhance the signal and control the dynamic range as unobtrusively as possible, or used more severely to specifically create an effect.

4.4 Input Stage.

The Input Gain control sets the level of the line or instrument signal into the 5021. Both the line input and the instrument input remain active simultaneously, therefore it is recommended to disconnect any inappropriate connection when not in use to minimise noise. The instrument input allows high impedance instruments such as guitars or a bass etc to connect directly into the 5021 and eliminates the need for a DI (Direct Injection) Box. A wide range of signals can be fed into the 5021, and the Input Gain control also allows the valve stages to be driven to a variable degree. After the preamp stage the signal passes through a triode valve stage positioned between the input circuit and the compression section. Increasing the input gain pushes more signal level into the valve, thus generating more harmonic distortion and creating that special “valve sound”. This is indicated by the yellow drive led which will glow more intensely as the level increases. At the same time the output level can be turned down to preserve the same level at the outputs, so a choice of sounds is available. For a more pronounced valve sound, turn up the input gain and reduce the output gain, and vice versa for a cleaner sound. Don’t be afraid to push the 5021 hard!

As well as driving the valves harder, increasing the Input Gain control setting will also have a pronounced effect on the amount of compression, as the threshold will remain constant as the input level increases. If the input gain is adjusted, the threshold can be altered accordingly to maintain a similar amount of compression.

4.5 Drive and Peak LEDs.

The yellow Drive LED provides a visual indication of the signal level through the valve stages, and therefore the extent of “warming” or valve character being introduced. The drive LED will gradually illuminate as the input level or gain is increased, over the range 0dB to +12dB.

The red Peak LED operates as a conventional warning that clipping is about to occur. The operating level of the entire signal chain is monitored, and the LED illuminates when there is less than 5dB of headroom remaining. Normal operation would be to set the input gain so that the drive LED is regularly illuminating, with occasional lighting of the red Peak LED on transients.

If the input and output gain controls are set to their centre (0dB) positions, the Peak LED will illuminate some 8dB after the Drive LED has reached its full intensity. However, it is possible to add gain further down the chain (i.e. output

level gain), which will cause the Peak LED to illuminate at a lower level of Drive. This situation implies that a high level of “clean” signal is present, without driving the valves hard.

4.6 Threshold.

The Threshold is the signal level - measured in dB - above which any compression comes into operation. The Threshold control is variable from +20dB in the fully anticlockwise position to -20dB at the fully clockwise position. Any signal below the Threshold passes through the unit unaffected; while signals above the Threshold are reduced in gain (and are thus ‘compressed’). This does depend to some extent on whether soft or hard knee mode is selected, as the soft knee is more gradual in effect around the Threshold point.

Unlike some compressors, the Threshold control on the 5021 starts at a ‘plus’ value in the anti-clockwise position, and decreases to a ‘minus’ value as you rotate the control clockwise. The reason for this is as you turn the Threshold control on the 5021 clockwise (i.e. towards the negative region) then the degree of compression will increase. We think this is logical, whereas the common method of turning the control ‘down’ to achieve more compression is not - but beware, some other compressors may work in the opposite direction!

4.7 Ratio.

Once the input signal has crossed the threshold, the degree of gain reduction is determined by the Ratio control. The Ratio control is calibrated in decibels and is simply the change in output level that results from a given change in input level. An uncompressed signal will have a 1:1 compression ratio - every 1dB change in input level results in the same 1dB change in output level. A compression ratio of 1:3, for instance, means that a 3dB change in input level will only give a 1dB change in output level. For more severe compression, simply turn up the Ratio control.

The 5021 offers a wide range of ratios from 1:1.5 (gentle compression) through to 1:30 (limiting). Limiting effectively clamps the input signal at the threshold level no matter how much the signal is increased: this can be useful when trying to ensure that the signal doesn’t exceed a certain level - for instance to prevent a digital recorder distorting through overload.

4.8 Attack and Release.

The Attack time sets how quickly the compression is applied once the threshold has been exceeded, and the Release time sets how quickly the compression is released (and the signal returns to normal) once the signal drops back below the threshold. The 5021 Attack and Release controls each allow a choice of four switched positions between ‘Slow’ and ‘Fast’. For Attack this covers the range 0.5mS to 40mS, while the Release control spans 40mS

to 4S. There is an element of automatic operation of the Attack and Release on the 5021: for instance, should a very short transient occur the time constants tend to become shorter, to prevent a slow release leaving a “hole” in the signal after the transient. Also, a fast release setting will be extended by a slow attack setting. Due to this automatic nature of the time constants, the controls are simply labelled ‘Slow’ to ‘Fast’.

The speed of the Attack and Release should in general be able to work with the tempo of the signal. For example if the signal is a snare drum, by monitoring the gain reduction it is possible to set the Release to allow the compression to fully recover (i.e. the gain reduction needle will settle back to 0dB) before the next snare beat. This prevents the second snare beat being reduced in level in comparison to the first. One side-effect of having an incorrect release setting is distortion on low frequency signals, which can particularly occur when using a fast release setting on bass heavy signals - the compressor is forced in and out of compression during one cycle of the waveform, and distortion results. The 5021 has a built-in “Hold” facility which delays the onset of release for approximately 10mS after the input signal falls below the threshold. If distortion is still experienced, a slower release time should be used.

4.9 Knee.

The Knee switch enables the 5021 to be operated in two different modes - soft knee or hard knee. Soft knee mode offers a gentle compression curve around the threshold point, and is traditionally employed to yield a more subtle, musical type of compression effect. The hard knee setting causes the full compression ratio to be applied immediately the signal has passed the threshold point, so tends to produce more pronounced and severe compression.

4.10 Gain Make Up.

While the subjective sound quality of the signal can be improved by compression, the overall signal level will be reduced when gain reduction is taking place. The Gain Make Up control is designed to boost the compressed signal by between 0 and 20dB, in order to bring back the level to the same loudness as the uncompressed signal. Without this control, comparing the original and compressed signals becomes difficult, since there would be a level drop each time the compressor is switched in: therefore it is normal to adjust the Gain Make Up control so that when the ‘compressor on’ switch is activated, the audio signal remains constant in level.

Unlike the Output Level control, the Gain Make Up control is active *only when the ‘compressor on’ switch is engaged.* Once the Gain Make Up has been adjusted, use the Output Level control to set the overall output level of the 5021.

4.11 Compressor On.

This switch enables or disables the compressor stage, thus allowing an A/B comparison to be made between the original untreated signal and the compressed signal. Any gain make up applied to the signal only becomes active when the “Compressor On” is enabled. An associated status LED indicates when the compressor is active. The Gain Reduction on the VU meter will monitor the level of compression regardless of the compressor stage being active or non active.

4.12 Stereo Link.

In dual mono mode, the 5021 can process two separate signals (such as a vocal on channel A and a bass guitar on channel B) and provide completely independent control of each. Alternatively the ‘Stereo Link’ mode links the control voltages of both channels and is typically selected when the 5021 is used for processing signals such as an overall mix, or a stereo feed from a sound module.

Stereo linked compression is essential to avoid imbalances in the stereo image (known as “dips”) to appear on one side of a stereo signal, if the signal exceeds the threshold on that side only. If a compressor has not been stereo linked, the “dipping” of one channel can sound very obvious and unnatural. In linked mode, if either signal crosses the threshold setting, both channels will react together and will be compressed by the same amount. For best results, both channel settings should be made the same to maintain a consistency over the stereo image.

4.13 Meter.

The 5021 is equipped with two illuminated VU meters: one for each channel. Normally the VU meter reads the audio output level, and is calibrated to read 0VU for a +4dBu output level. Increasing the output level control on the 5021 towards the +20dB setting will cause the 5021’s meters to move further towards the red area and possibly to the end of the scale if sufficient gain is applied. When switched to ‘Gain Reduction’, the meter indicates the amount of compression occurring. If the signal is below the threshold, the meter will indicate 0dB: i.e. no gain reduction. As the signal passes through the threshold, the meter will start to indicate the gain reduction at the compressor stage (this will be a *negative* value, so the meter will move to the left, away from 0VU). Note that this reading won’t include any extra gain make-up applied.

4.14 Frequency Conscious Compression.

The provision of sidechain insert points on the 5021 allows the unit to perform frequency conscious compression, such as ‘de-essing’. This is achieved by patching an equaliser (normally a parametric or graphic type) into the sidechain (the insert point works on a send-and-return principle whereby the

insert ‘send’ connects to the equaliser input, and the equaliser output connects to the insert ‘return’, thus completing the circuit). Once connected, any frequency boosted on the equaliser will effectively lower the compression threshold at that frequency. To de-ess, for instance, use a parametric EQ patched into the insert point and try boosting the sibilant frequency (normally 3-5kHz) using a narrow bandwidth setting on the EQ. This should make the 5021 more sensitive to the boosted frequency, thus compressing it to a greater degree.

4.15 Gate.

A gate (or noise gate) is a device that can completely shut off or mute the signal path in order to prevent unwanted low level signals from passing. The closing of the 5021 gate is triggered by the level of the input signal falling below an adjustable threshold point (in this case the threshold is adjusted by the ‘Gate’ control over the range -10dB to ‘OFF’). Gates are commonly used to shut out background noise or hiss from noisy signals or to isolate a louder signal from other quieter signals. An example of this would be when miking up a drum kit with a number of individual mics on specific drums. Each mic will pick up not only the drum it is directly miking but also all the neighbouring drums. By gating out the quieter neighbouring drums each drum track can be “cleaned up”. The trick to using the gate successfully is to adjust the threshold to the point where the desired signal opens the gate and the undesirable signal is below the threshold point and is gated out. This is never an easy task as the threshold point remains constant but the point between desirable signal and undesirable signal is continuously changing. Gating can be a tricky process to get right as success depends a great deal on the signal characteristics.

The gate on the 5021 is situated before the compressor stage and has a red LED indicating when the gate is active (i.e. shut). At the fully anti-clockwise position the gate is at its ‘off’ position and is completely inactive. Turning the gate clockwise towards the -10dB maximum setting raises the threshold point so that the signal needs to be increasingly louder (as the threshold is raised) to open the gate. At the lowest setting, just above the ‘off’ position, low level signals such as background noise can be gated. Raising the threshold point allows gating of higher level signals such as drums. If you are having trouble selecting the threshold point, one tip is to select different threshold points suitable for specific parts of the signal and mark them with a chinagraph pencil. For example the intro to the signal may be quite strong - so the threshold can be set quite high - and the end of the signal may have a gradual fade out, so the threshold can then be adjusted to suit this ending. This of course is only practical with recorded signals where the track can be constantly replayed to practice the settings.

4.16 Output Gain.

This controls the level at the 5021 output stage. The nominal level is 0dB at the centre detented position. This control effectively acts like an output fader, and is very useful when recording direct to tape or hard disc through the 5021. You may find that some digital recorders require a good deal of input level in order to register a 0dB reading on their meters (a +18dBu analogue output usually matches 0dBFS in the digital scale). This is normal, since many digital recorders are designed to preserve headroom and keep the signal well below the 0dB clip point - thus preventing the recorder distorting. The 5021 provides a further 20dB of gain at the output fader to drive digital recorders. It is important to distinguish the difference between the output gain knob and the gain make-up knob in the compressor section. The gain make-up control is only active when the compressor is switched on. The output gain control is always active but will have no effect on the compression characteristics of the signal.

4.17 Optional DO-2 Digital Output Card.

The 5021 is designed to accept the optional D0-2 24 bit digital A to D converter card to allow easy interfacing of the 5021 with devices such as sound cards and digital recorders. The card feeds the converted output signals of channels 1 and 2 to the SPDIF phono output. The sample rate is switchable between either 44.1kHz or to 48kHz, and the card can be clocked to an external digital source via the BNC wordclock input. When clocking the DO-2 to an external source the sample rate setting on the DO-2 needs to be set to match the external sample rate, otherwise correct locking may not occur and audible clicking may appear on the digital output. In terms of gain, the DO-2 will generate a signal level of 0dBfs in the digital domain when +18dBu of output level is generated at the balanced line output of the 5021.

5. GETTING STARTED

5.1 Connections.

There are various ways that the 5021 can be connected into your audio system. The four most common are:

a) As an instrument front end
b) Connected to a channel insert point on a mixing desk
c) Connected to a group or master insert point on a mixing desk
d) Connected in-line from the mixer's master outputs to the 2-track recorder

To use the 5021 as an instrument front end, connect the output of the 5021 directly to the line (not mic) input of your console, recorder or sound card. A common mistake is to plug the XLR line output into the XLR mic input of a console. This will cause the console mic inputs to overload very easily and

may result in a loss of quality. The 5021's balanced line outputs are the recommended connections to use for the best sound quality. Once the output is connected, simply feed your instrument into the front panel jack input on the 5021. Recording direct to the multitrack recorder (thus bypassing the console) is a common technique these days as it keeps the signal path short, and of the highest quality. No unnecessary console stages are passed through, thus maintaining quality.

Many mixers have sockets called 'insert points', which allow processors such as dynamics devices and EQs to be patched in-line into the mixer signal path at various points. The mixer's channel insert point usually 'sends' the input signal out directly after the mixer's preamp stage - allowing connection to the line input of the 5021 - and then returns the processed signal from the line output of the 5021 back into the mixer at the same point in the signal path. This is commonly achieved using a special insert cable (sometimes known as a 'Y' lead or split lead - usually a stereo 0.25" jack connector at one end split into two mono jack connectors - one for send and one for return). The most likely positions that insert points are located on a mixer are in the channel, group and stereo master sections. Patching the 5021 into the channel insert point means that any signal passing through that channel will pass directly though the 5021. Compressing a vocal, for instance, can be achieved by connecting the microphone directly to the console mic input, then connecting the 5021 into the console insert point. The mic signal will be amplified by the mixer before being passed into the 5021's line input via the mixer insert 'send' connection. The line output of the 5021 connects back to the insert 'return' connection, thus returning the signal to the mixer and ensuring continuous signal flow.

Group insert points are used to process sub-grouped signals such as drums or backing vocals. It's common to mix an entire drum kit to a stereo group, and then use a pair of group faders to control the overall level, rather than having to adjust each individual drum level. If you then wish to compress the overall stereo kit signal, you can connect a stereo linked 5021 to the relevant group insert points, using the same 'send and return' technique as the channel insert.

Having processed individual tracks while recording, it is common to apply some compression to the stereo mix while mastering it to 2 track tape, DAT or CDR. Doing this will help fatten the sound further and control levels. Like the channel and groups, the stereo L/R mix buss will normally have a pair of insert points to facilitate this. If not, the 5021 can be connected in-line with the mixer's main stereo outputs, ahead of the master 2 track recorder. The latter method may be preferable as this allows the processors to be connected with balanced connectors (the insert points are usually unbalanced). Connecting the 5021 to the main insert points does however allow the processing to be monitored as the processor is looped into the output stage of the mixer. If the 5021 is connected in-line, to hear the results of the processing the 2 track mastering machine needs to be monitored. This is possible by connecting the

mastering recorder to the mixer's 2-track return inputs and monitoring these returns on the mixer.

The optional DO-2 digital output will allow a stereo high quality A/D conversion at 24-bit from the 5021 on a coaxial SPDIF output. The DO-2 can feed directly into digital recorders such as Digital Multitrackers, Hard Disk Recorders, DAT Recorders, Minidisc and CD-Recorders, bypassing any A-D conversion stages on the way. When connecting the DO-2's SPDIF output it is advisable to use cables less than 5 metres in length and of high quality. The digital output can be used simultaneously with the 5021's analogue outputs.

5.2 In Use.

Having connected the 5021 - checking that the operating level switch is at the most suitable setting (see section 3.2) - it's time to put it into action! Here's a simple step by step guide:

1. The first stage is to set up the gains of the 5021. With the compressor stage switched out, start with the input and output levels at 0dB.

2. With the 5021 meters set to read the output level, adjust the 5021 input level so that the Drive LED starts to illuminate, and then adjust the 5021 output level to achieve a peak reading of around 0VU with the chosen source material.

3. If more output is required the output level can be adjusted accordingly without affecting the compression characteristics. Beneath the 5021 input level control there is a red "Peak" LED. This illuminates to warn that the signal is 5dB below clipping, and it monitors both the input stage and the output stage. If the Peak LED is lit when the output level and gain make-up are very low, this means the input level may be set too high. Alternatively if the Peak LED lights up when the input level is low, then the gain make-up or the output level control may be too high. Illumination of the Peak LED is not necessarily a problem - it is merely a warning that the levels are getting close to clipping.

4. Now depress the Compressor 'On' switch, and select the Meter switch to read Gain Reduction.

5. Using the compressor's controls you will need to adjust settings to suit the instrument you are listening to. A good starting point is set the Attack and Release to 'Fast', Ratio to 1:3, Knee to 'Soft', and Threshold to +20dB.

6. As you start turning the Threshold control clockwise towards 0dB, the meter should now register that some gain reduction is taking place. Aim to get around a maximum 3-4dB of gain reduction occurring as a

starting point, by lowering the Threshold further if necessary. You should also notice that increasing the Ratio setting causes more gain reduction to occur.

7. When gain reduction is taking place, you should notice that the output level is reduced. By switching the compressor 'in' and 'out', you can compare the levels and the subjective sound quality of the original and compressed signals. With the compressor active, use the Gain Make-Up control to set the level so that when disabling the compressor, there is no level drop. This way you can A/B the original and compressed signals without the levels changing.

8. At this stage if you are unfamiliar with compression you should experiment with each control to see how it affects the sound. Until you are familiar with using compressors it can be difficult to hear these changes as a good compressor will retain the natural sound of the source signal. If in doubt aim to use compression gently as it can be difficult to compensate for over- compression. On the other hand there are no rules, so if extreme settings get you the effect you are after, the choice is yours. Let your ears be the guide.

9. For stereo signals or mixes, channels A and B need to be linked by activating the 'Stereo Link' switch in the centre of the 5021. This enables both channels to react equally whenever a signal on either channel exceeds the threshold point. To maintain a consistent stereo image the controls on both channels need to be set to the same values.

6. SPECIFICATIONS

Line Inputs: Balanced XLR, switchable +4dBu/+18dBu nominal level.
Unbalanced jack, switchable -10dBu/+4dBu nominal.

Instrument Input: Via front panel 0.25" jack socket,
Input Impedance 1Mohm.

Input Gain Range:	+/-20dB (Line), -2dB to +38dB (Instrument).
Maximum Input Level:	+26dBu (Line), +10dBu (Instrument).
Outputs:	Balanced XLR, switchable +4dBu/+18dBu nominal level. Unbalanced jack, switchable -10dBu/+4dBu nominal.
Output Gain Range:	+/-20dB.
Maximum Output Level:	+26dBu (XLR), +12dBu (Jack).
Gate:	Threshold variable -60dBu to -10dBu.
Compressor:	Threshold -20dBu to +20dBu, Attack 0.5msec to 40msec, Release 40msec to 4 seconds, Ratio 1:1.5 to 1:30, Hard / Soft Knee switch, Gain Make-Up 0 to +20dB.
Drive LED:	Increasing intensity to reflect valve drive, commencing at +4dBu to full brightness at +14dBu (Output level control at 0dB).
Peak LED:	+20dBu. Monitors input and output levels.
VU Meter:	Switchable to Output level, (0VU = +4dBu), or Gain Reduction (Compression).
Frequency Response:	10Hz to 20KHz, +0, -1dB. (Compressor On).
Distortion:	Predominately second harmonic, increasing with "Drive" level. Typically 0.5% @ 0dBu.
Noise:	-80dBu, 22Hz to 22KHz, line input at 0dB input and

output gain, Compressor on.

Dynamic Range: 106dB (Line input @ 0dB gain).

Sidechain Insertion Points: Unbalanced, switched 3 pin jack socket,
tip = send, ring = return,
Nominal level -2dBu,
Output impedance 47 ohms,
Return input impedance 10Kohms.

Power Requirements: Internally set to 230V 50Hz or 115V 60Hz operation,
Detachable IEC power cord,
Power consumption 20VA typical.

Dimensions: 19” rack mounting, 2U high,
W x H x D: 483 x 88 x 200mm (19.0” x 7.9” x 3.5”).

Shipping Weight: 6kgs.

The above specifications are typical figures, and are subject to change without notice.

7. SERVICE

Should the 5021 require service, it must be taken or posted to an authorised dealer with a description of the fault. Please retain the original packing for possible future use, and ensure the unit is suitably protected during transit. The manufacturer cannot accept responsibility for damage caused during transportation.

The 5021 is supported by a limited warranty for a period of one year from the date of purchase. During this period, any faults due to defective materials or workmanship will be repaired free of charge. The warranty excludes damage

caused by deliberate or accidental misuse, tampering, operation on the incorrect mains voltage, or without the correct type and value of fuse fitted. It is the user's responsibility to ensure fitness for purpose in any particular application. The warranty is limited to the original purchase price of the equipment, and excludes any consequential damage or loss. When claiming service under warranty, proof of purchase date must be included with the equipment for repair.

Please record the following details, and retain proof of purchase:

Serial Number.....

Date purchased.....

Dealer.....